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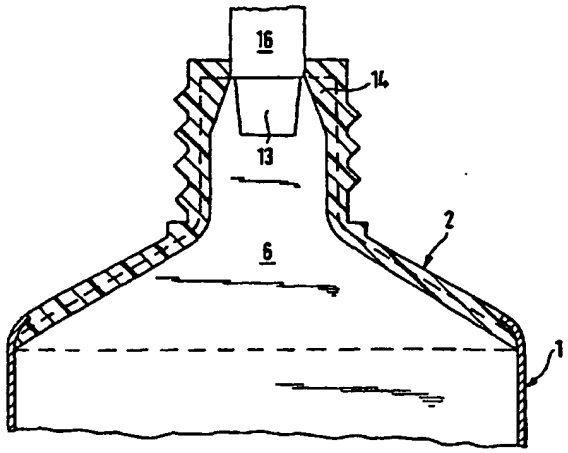
(54) Title: TWO–CHAMBER TUBE

(54) Bezeichnung: ZWEIKAMMERTUBE

(57) Abstract

The invention relates to a two–chamber tube consisting of a tube pipe (1) and a tube head (2) which is moulded on and which has a shoulder (3) and a central neck (4). A through channel (7) which opens into a sealable discharge opening (8) is located in said neck. A dividing wall (6) is situated in the tube pipe (1) and in the tube head (2). The invention also relates to a device for producing a two–chamber tube. According to the invention, a channel section (10) that is tapered in the shape of a cone and in which the upper end of the dividing wall (6) is anchored adjoins the cylindrical through channel (9) in the direction of the discharge opening (8). At least the upper part of the dividing wall (6) in the tube head (2) is preferably produced by compression moulding when the tube head (2) is moulded on and a cut–out section (13) is provided in the upper part of the dividing wall (6).



(57) Zusammenfassung

Die Erfindung betrifft eine Zweikammertube, bestehend aus einem Tubenrohr (1) und einem angeformten Tubenkopf (2), der eine Schulter (3) und einen zentralen Hals (4) aufweist, in dem ein Durchgangskanal (7) besteht, der in einer verschließbaren Ausgabeöffnung (8) mündet, wobei im Tubenrohr (1) und im Tubenkopf (2) eine Trennwand (6) angeordnet ist und eine Vorrichung zur Herstellung einer Zweikammertube. Erfindungsgemäß schliesst sich an den zylindrischen Durchgangskanal (9) in Richtung zur Ausgabeöffnung (8) ein konisch verjüngter Kanalabschnitt (10) an, in dem das obere Ende der Trennwand (6) verankert ist. Vorzugsweise sind mindestens der obere Teil der Trennwand (6) im Tubenkopf (2) durch Kompressionsformen beim Anformen des Tubenkopfes (2) hergestellt und im oberen Teil der Trennwand (6) ein Ausschnitt (13) ausgeführt.

Abstract

The invention relates to a dual chamber tube consisting of a tube body (1) and a moulded-on tube head (2) comprising a shoulder (3) and a central nozzle (4) in which there is a through duct (7) which opens in a closable outlet (8), a partition (6) being arranged in the tube body (1) and in the tube head (2), and to an apparatus for producing a dual chamber tube. According to the invention, a conically tapered duct portion (10) in which the upper end of the partition (6) is fixed adjoins the cylindrical through duct (9) in the direction of the outlet (8). Preferably at least the upper part of the partition wall (6) in the tube head (2) is produced by compression moulding during the moulding-on of the tube head (2) and a cut-out (13) is formed in the upper part of the partition (6).

DUAL CHAMBER TUBE

Background of the Invention

The invention relates to a dual chamber tube.

Tubes of this type are known, for example, from DE-C196 40 833. Each chamber can be sealed tightly by a closure cap, so contact or connection between the two components within the tube and ultimately also during discharge is not possible. Discharge takes place in two streams which are separated, i.e. do not adhere or only adhere inadequately to one another.

Dual chamber tubes are known from US-A-5 102 016 which inter alia also have an upper and lower partition divided by a gap, the upper partition having a cross-section extending conically in the nozzle to the outlet. There is also a strict separation of the partial streams in the discharge region.

It is advantageous with some components or materials which sensibly have to be stored separately if they are combined with one another at least to a certain extent or are combined to form a single stream of material, as with a tube without a partition, when they are discharged, to prevent the two partial streams from falling apart or to achieve the close combination thereof.

Object of the Invention

It is an object of the present invention to overcome or ameliorate some of the disadvantages of the prior art, or at least to provide a useful alternative.

Summary of the Invention

There is firstly disclosed herein dual chamber tube, consisting of a tube body and a moulded-on tube head, which has a shoulder, a central nozzle, a through duct, with a cylindrical portion and a portion which tapers conically in the direction of the outlet, in which portion the upper end of the partition is anchored, and a closable outlet, a partition being arranged in the tube body and in the tube head, wherein a cut-out is formed in the upper part of the partition.

There is further disclosed herein apparatus for producing a two chamber tube according to the above with a multi-part mould which reproduces the external shape of a tube head and into which one end of a tube body and a mandrel which is provided with a gap for receiving a partition and reproduces the internal shape of the tube head can be introduced, and with a punch which interacts with the introduced mandrel and can be fed through the mould, wherein the mandrel has a conically tapered portion in the region forming the through duct in the nozzle.

The invention preferably provides a dual chamber tube of the type mentioned at the outset, such that the components which are otherwise kept separate will flow together and adhere to one another as they are discharged.

The invention preferably provides a dual chamber tube of the type mentioned at the outset in that a cut-out is formed in the upper part of the partition.

Brief Description of the Drawings

A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, wherein:

Fig. 1 is a detail of a dual chamber tube according to an embodiment of the invention in an axial section perpendicular to the partition;

Fig. 2 shows the same as Fig. 1 in the section in the plane of the partition;

Fig. 3 shows an apparatus for moulding on a tube head onto a tube body with partition, the upper part of the partition ending directly below the outlet;

Fig. 4 shows a corresponding apparatus wherein the upper part of the partition is produced by compression moulding;

Figs. 5A and 5B show two cross-sections through tube bodies with a partition for dual chamber tubes;

Figs. 6A and 6B show blanks of partitions.

Detailed Description of the Preferred Embodiments

The detail of a dual chamber tube shown in Fig. 1 comprises a tube body 1 and a moulded-on tube head 2 which contains a conical shoulder part 3 and a nozzle 4. The nozzle 4 is provided with an external thread 5 for screwing on a closure cap, not shown.

Closures which can be pushed on without a thread can also be provided, for example, closures with hinged caps.

A partition 6 which continues into the interior of the nozzle 4 extends inside the tubular body 1 over its length. In the neck 4 there is therefore a divided through duct 7 which extends to the outlet 8 at the end of the nozzle 4. The lower part 9 of the through duct 7 is cylindrical in design. It is adjoined as far as the outlet 8 by a conically tapering part 10 which causes the streams of material to flow together on extraction.

In the embodiment according to Fig. 1 the outlet 8 is cylindrical and the partition 6 ends directly below the outlet 8. The closure cap, not shown, comprises an internal cylindrical projection which, when the closure cap is screwed onto the thread 5, interacts with the upper end of the partition 6 and therefore completely separates the respective components in the chambers 11, 12 from one another when the closure is closed. Depending on the height H of the cylindrical outlet 8, a more or less strong combination and mutual adhesion of the streams of material issuing from the chambers 11 and 12 take place as the two components are discharged through the outlet 8.

If a stronger combination between the streams of material is desired even before they reach the outlet 8, the partition 6 - if a rotating closure is provided - comprises a cut-out 13 which is symmetrical to the longitudinal axis of the partition 6 at the upper end (Fig. 2). This cut-out 13 from the partition 6 can be rectangular, also square or conical, in which case the larger base is at the outlet 8. Suitable conical configurations include a tapering or truncated cone shape. In the case of hinged closures, the cut-out 13 can be configured substantially freely, and a symmetrical configuration is not then required in any case. Owing to the cut-out 13 in the partition 6, the streams of material issuing from the chambers 11, 12 come into contact with one another much earlier and can therefore be combined with one another better - in particular also owing to the flowing together on account of the taper in the nozzle 4. To ensure that the two components are separated during storage, a screw-on closure cap, not shown, comprises a rotationally symmetrical

projection and a hinged closure cap has a projection of substantially any configuration which interacts positively with the recess 13 and ensures that the two components are separated when the closure is closed. As shown clearly in Fig. 2, the upper portion of the partition 6 extending into the nozzle 4 need not be tapered so it is surrounded by more plastics material of the integrally moulded tube head 2 - actually in the outlet region -, with the result that it is fixed very well and securely actually in this part. It is obviously also possible to configure the upper portion of the partition 6 to taper similarly to match the conical tapering part of the internal nozzle 4.

Fig. 3 shows an apparatus for producing a dual chamber tube. The apparatus comprises a multi-part mould 15 with a centrally adjustable sprung punch 16, adjustable parts 17, 17' which are used for producing the external shape of the nozzle 4 - with thread 5 here - and a shape 18 which serves to receive one end of the tube body 1 and to produce the external shape of the shoulder part 3 of the tube head 2 and simultaneously to connect the tube head 2 to the tube body 1. A mandrel 19 can be introduced into the mould 15, the mandrel 19 consisting of two mandrel parts 20, 20' of which the leading end has an external shape which corresponds to the internal shape of the tube head 2 including the through duct 7 of the dual chamber tube. The partition 6 is arranged in the parting gap 21 and in the adjoining widened slot 22 between the two mandrel parts 20, 20'.

In the embodiment shown in Fig. 3, the parting gap 21 in the leading end of the mandrel 19 (in the tube head region) has a thickness which is adapted to the thickness of the partition 6 and corresponds to it. This narrow parting gap 21 has to end above the plane of the tube head which is to be integrally moulded or has to extend at least into this region as melt can otherwise penetrate into the parting gap 21 when the head is moulded on. It serves to secure or clamp so to speak the upper end of the partition 6 between the leading ends of the mandrel parts 20, 20' and thus to stabilise the partition 6 while moulding on the tube head. The narrow parting gap 21 is adjoined by the widened slot 22 which serves to simplify introduction of the partition 6 between the mandrel parts 20, 20'. To simply this further, the two mandrel parts 20, 20' can also be displaced relative to one another to such an extent that the parts of the mandrel parts 20, 20' forming the narrow parting gap 21 lie in succession so that in-between there is a type of funnel with an opening width which is greater than the thickness of the parting gap 21. The displacement can be effected in the manner known, for example, from DE 196 40 833 C1, to which reference is made here.

In the embodiment shown in Fig. 4, the mandrel 19, between its two mandrel parts 20, 20', has a continuous widened slot 22 which is tapered merely at a point located in the head region or at its transition to the tube body 2 by two mutually opposed projections 23 in each mandrel part 20, 20'.

The distance between the two projections 23 preferably corresponds in turn to the thickness of the partition 6 used in order to hold it and stabilise it during the pressing-on process. Only the upper end of the partition 6 held between the projections 23 extends into the region 24 of the slot 22 extending from the projections 23 to the leading end of the mandrel parts 20, 20'. Molten plastics material also penetrates into this widened region 24 during the moulding-on of the tube head 2, the projections 23 preventing further penetration of molten material into the part of the slot 22 behind it, so the molten material surrounds the portion of the partition 6 projecting into the leading region and thus forms the upper portion of the partition 6 extending to the punch 16. This allows a purely rectangular blank to be used for the partition 6 as adaptation to the internal shape of the tube head and nozzle is unnecessarily, and this also avoids the formation of waste partition material caused by nozzle projections. The introduction of a partition without projections in a mandrel can also be achieved more easily technically.

The height H (Fig. 1) of the outlet 8 can be varied by the interplay of the leading end of the mandrel 19 with the end face of the preferably spring-loaded punch 16.

In the embodiment according to Fig. 4, the punch 16 can also comprise an attachment (indicated in Fig. 2) which serves to shape the desired cut-out 13 in the upper end of the partition 6 if the partition 6 is shaped from plastics material together with the head.

In Figs. 3 and 4, blanks, i.e. tube bodies 2, in which a partition 6 is already arranged are presented to the mould 15 by the mandrels 19. Fig. 5 shows two cross-sections of blanks with the arrangement of a partition 6 in a tube body 1. Fig. 5a shows a partition 6 provided with lateral angled edges 6a, 6b which project laterally beyond the two mandrel parts 20, 20' and can be arranged in longitudinal recesses 25 formed in the mandrel parts 20, 20'. The edges 6a, 6b can be moulded on or formed by suitable measures. If desired, the edges 6a, 6b are also rigidly connected to the tube body 1 by suitable means, for example by welding. In the embodiment shown in Fig. 5b, the

partition wall 6 is angled several times in cross-section and strikes against the tube wall 1 with its free ends.

Figs. 6a and 6b show blanks of partitions 6 side by side. The broken lines show bending edges which can be formed, for example, by preliminary stamping. The blank according to Fig. 6b should be used if the upper portion of the partition 6 provided for the head region is to be produced by compression of a molten plastics material simultaneously with the moulding-on of the head. All other blanks have projecting portions, integrated into the blank, for the head region. The embodiment of a partition 6 with multiple bends shown in Fig. 5b gives it a certain degree of elasticity in the tube body 1 and therefore a laterally resilient sealing effect against the surrounding tube body 1.

The partition 6 can be punched, for example, from a sheet of polyethylene (PE), wherein other plastics materials including high density polyurethane (HDPE) and also other materials used during the production of tubes can also be used. The thickness of such a partition can vary widely according to the desired stiffness, and a thickness of, for example, 0.2 mm has proven advantageous.

The claims defining the invention are as follows:-

1. Dual chamber tube, consisting of a tube body and a moulded-on tube head, which has a shoulder, a central nozzle, a through duct, with a cylindrical portion and a portion which tapers conically in the direction of the outlet, in which portion the upper end of the partition is anchored, and a closable outlet, a partition being arranged in the tube body and in the tube head, wherein a cut-out is formed in the upper part of the partition.

2. Dual chamber tube according to claim 1, wherein the cut-out is formed symmetrically to the central axis of the dual chamber tube.

3. Dual chamber tube according to claim 1, wherein at least the upper part of the partition in the tube head is produced by compression moulding during the integral moulding of the tube head.

4. Apparatus for producing a two chamber tube according to any one of claims 1 to 3 with a multi-part mould which reproduces the external shape of a tube head and into which one end of a tube body and a mandrel which is provided with a gap for receiving a partition and reproduces the internal shape of the tube head can be introduced, and with a punch which interacts with the introduced mandrel and can be fed through the mould, wherein the mandrel has a conically tapered portion in the region forming the through duct in the nozzle.

5. Apparatus for producing a dual chamber tube according to claim 4, wherein the mandrel consists of two mandrel parts which are arranged so as to be longitudinally movable relative to one another and receive the partition in the parting gap in-between, the parting gap having a narrow portion with an internal width corresponding to the thickness of the partition.

6. Apparatus according to claim 4 or 5, wherein the mandrel recesses at the periphery for receiving edges of the partition which project laterally from the parting gap.

7. Apparatus according to any one of claims 4 to 6, wherein the punch is provided with an attachment for producing a cut-out.

8. A dual chamber tube, substantially as herein described with reference to any one of the embodiments of the invention shown in the accompanying drawings.

9. An apparatus for producing a two chamber tube, substantially as herein described with reference to any one of the embodiments of the invention shown in the accompanying drawings.

Dated 23 April 2002
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Patent Attorneys for the Applicant/Nominated Person
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FIG.1

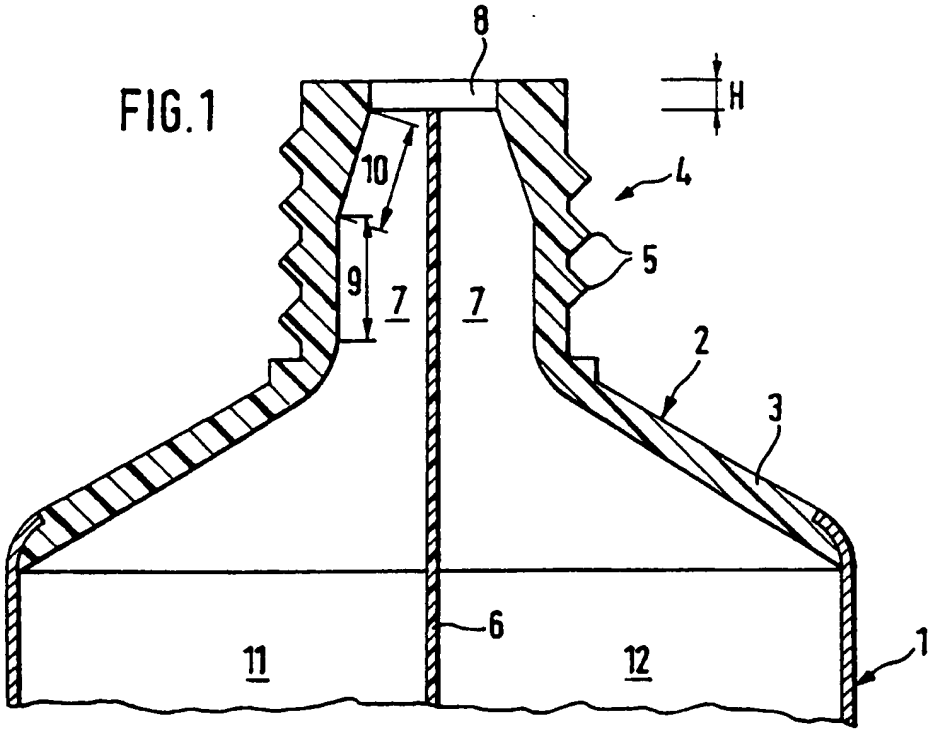
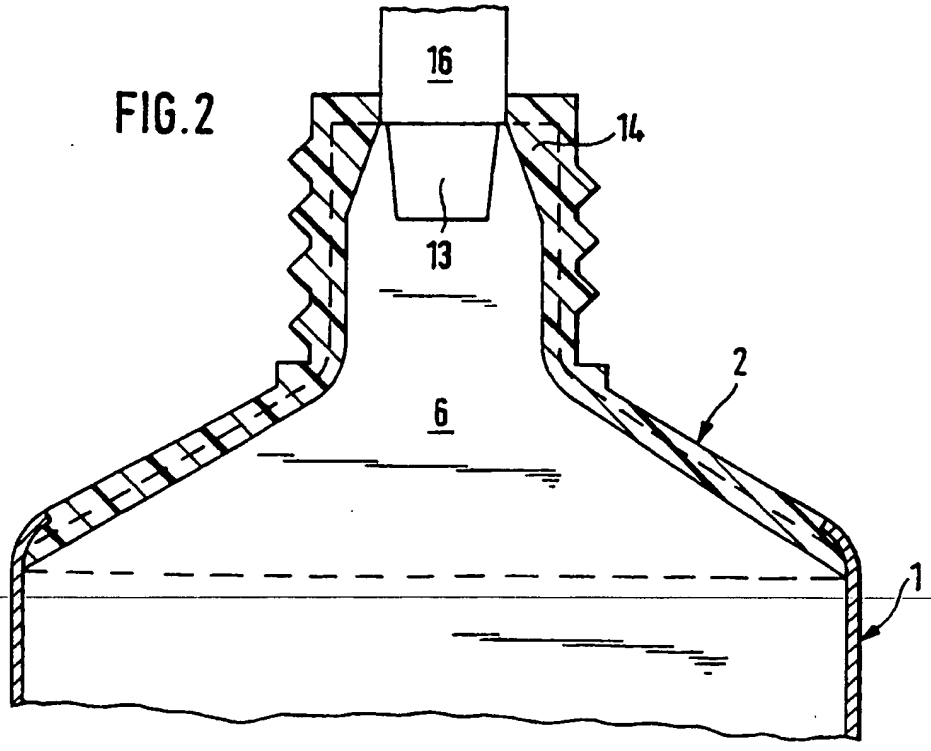


FIG.2



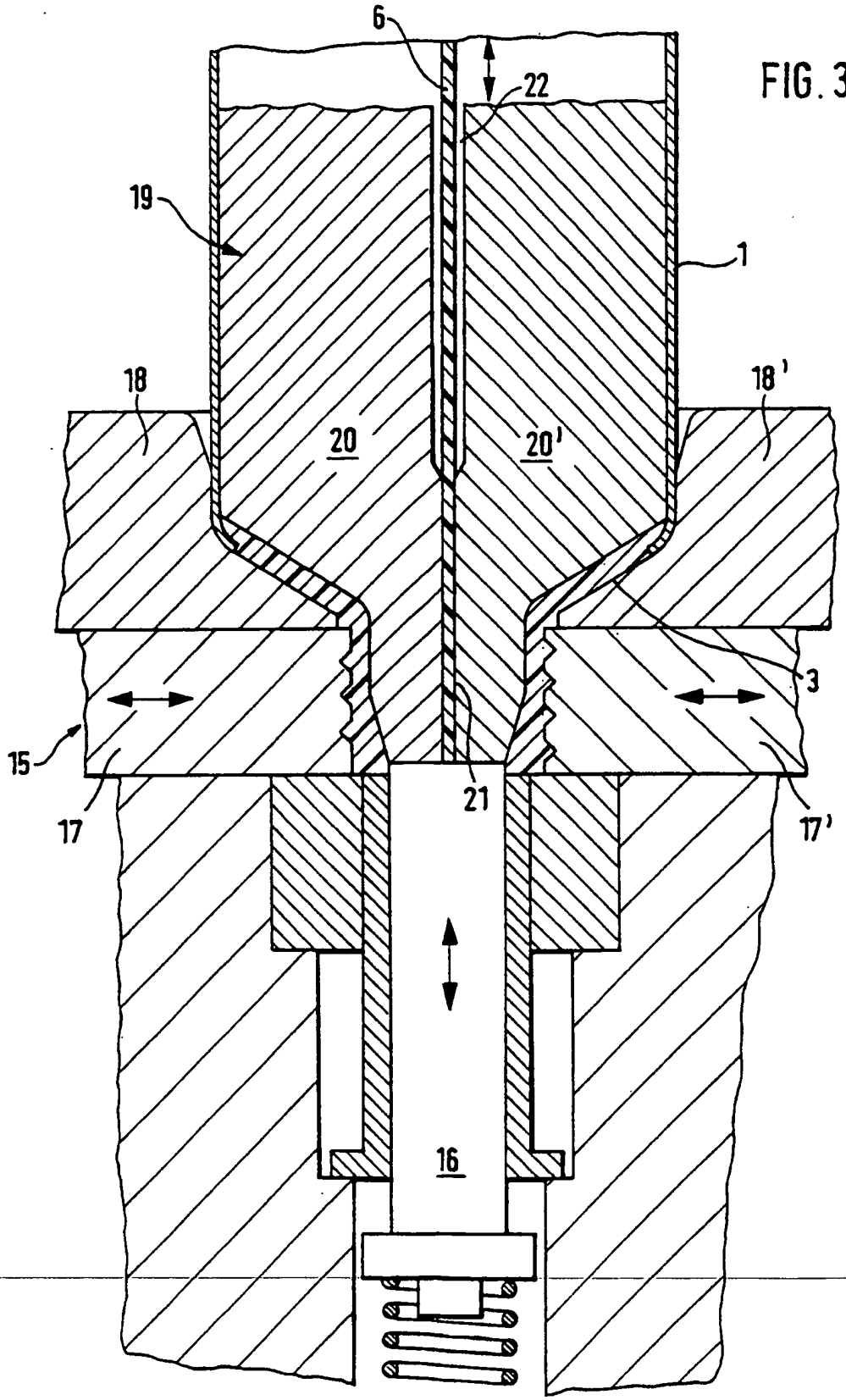
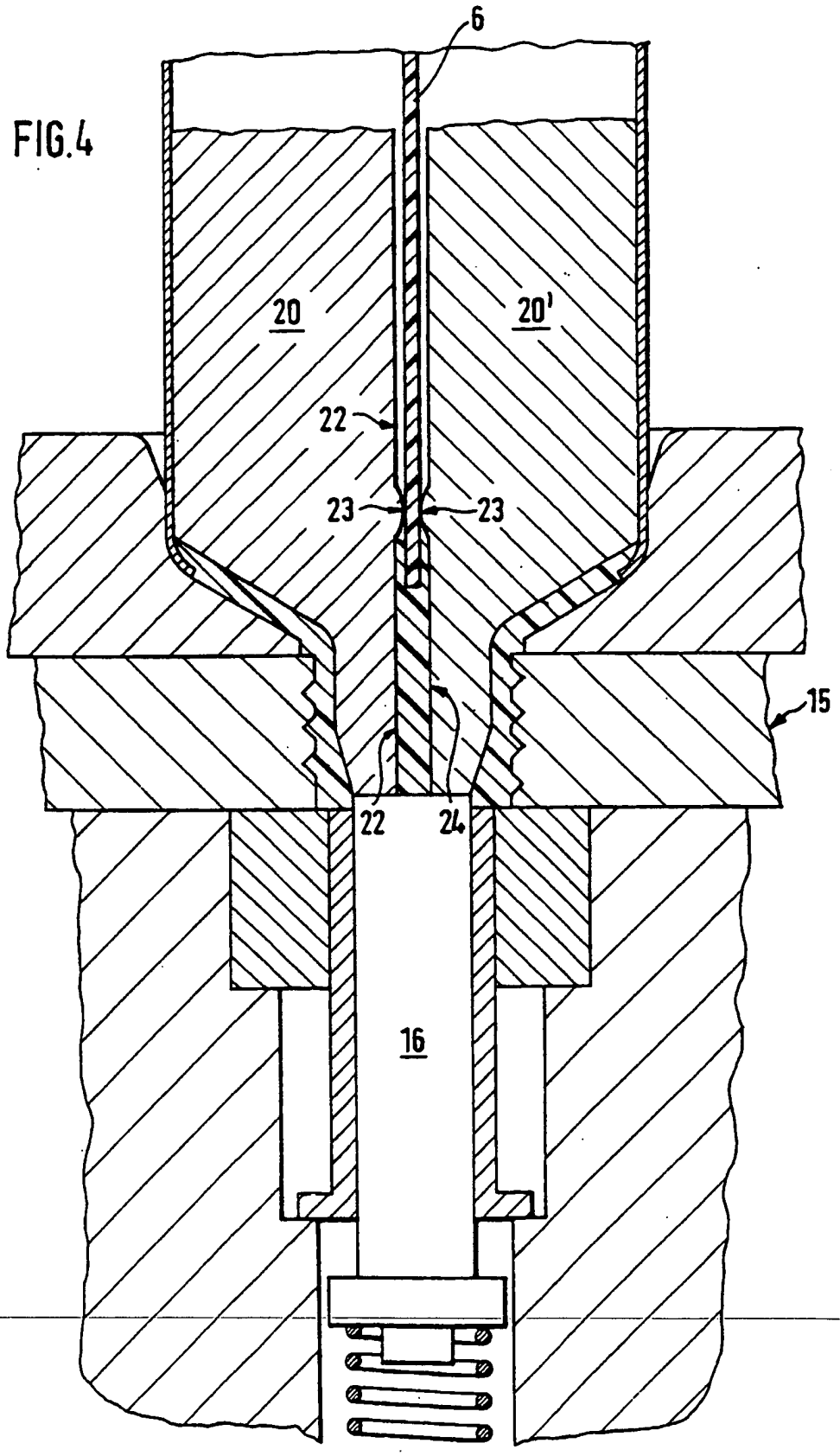


FIG. 3

FIG.4



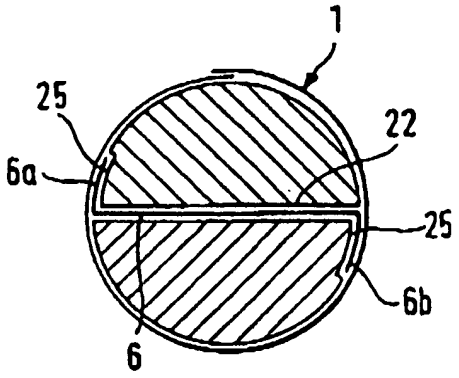


FIG.5A

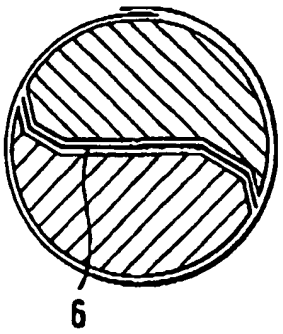


FIG.5B

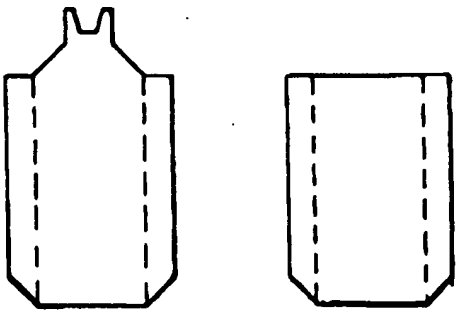


FIG.6A

FIG.6B